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NORTH LIVERPOOL RAILWAY.

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425

REPORT

ON THE

PROPOSED LINE OF RAILWAY

FROM THE

MANCHESTER & BOLTON RAILWAY

TO THE

NORTH END OF LIVERPOOL.

BY

MESSRS WALKER AND BURGESS,

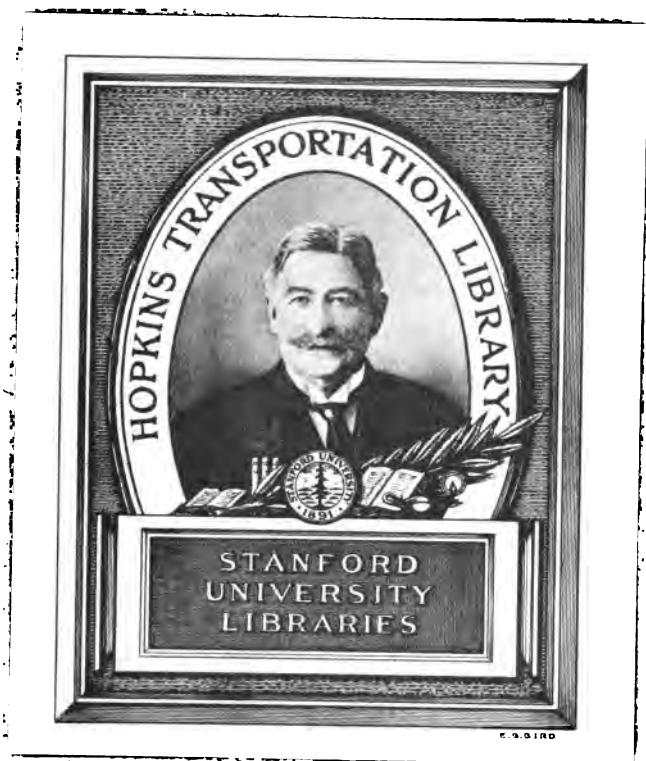
CIVIL ENGINEERS.

DATED 24th FEBRUARY, 1835.

WESTMINSTER :

VACHER & SON, 29, PARLIAMENT STREET.

1835.



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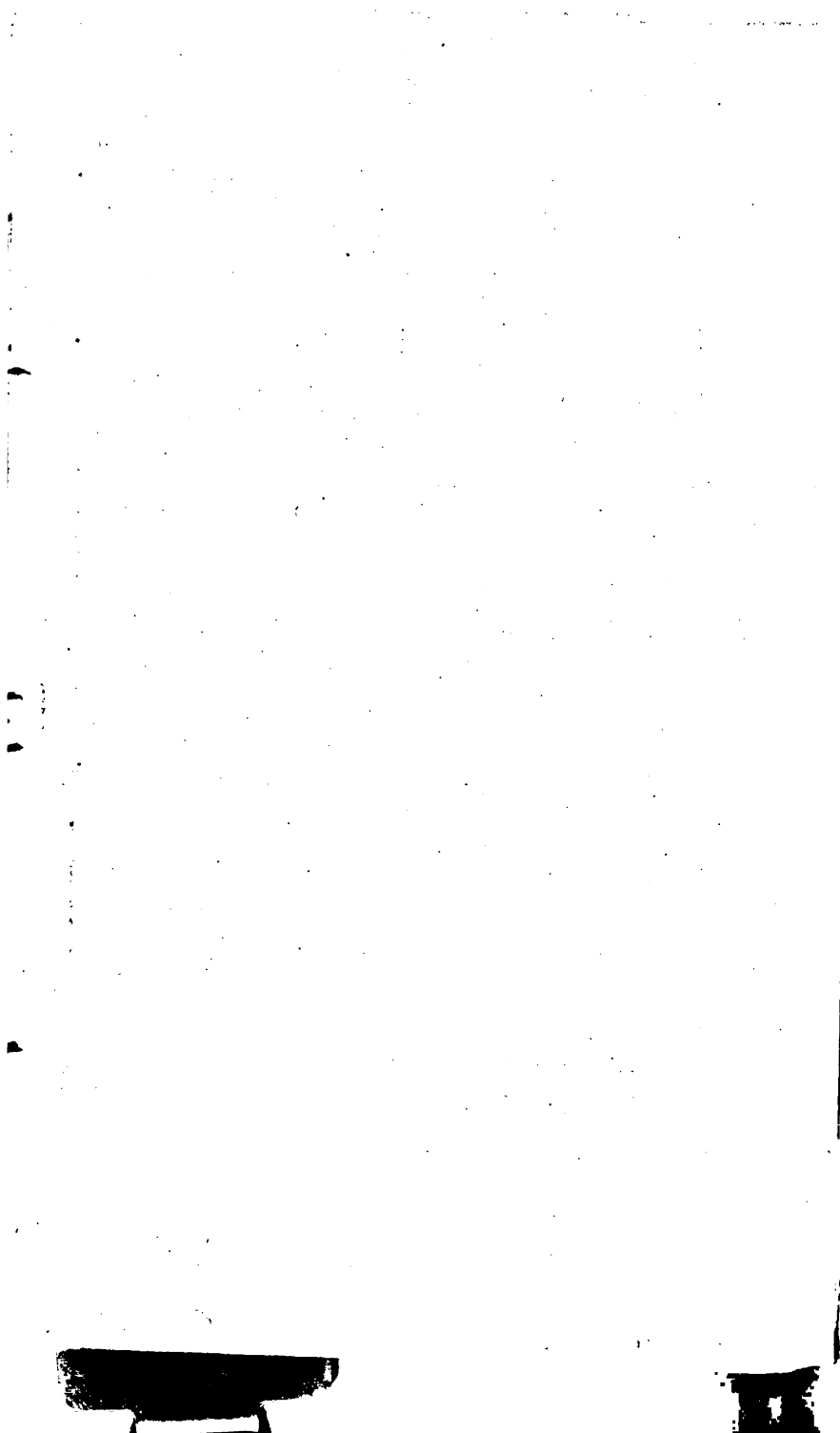
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Report on the proposed line of
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*To the Committee of Management of the Manchester
Bolton and Bury Navigation and Railway
Company.*

GENTLEMEN,

ALTHOUGH the accompanying engraving shews distinctly the line and levels of the proposed Railway from the Manchester and Bolton Railway near Pendleton, two miles and three quarters from Manchester, to the North end of Liverpool, an abstract exhibiting the same in one view with a short statement of the most important features of the work may be satisfactory.

The lengths and inclinations are as follow. Beginning at the Manchester and Bolton Railway, there are on the proposed line

| | |
|------------------------------|--------------|
| a rise of 1 in 310 for | 2½ miles, |
| a level of | 2½ miles, |
| a fall of 1 in 356 for | 3 miles, |
| a level of | 3 miles, and |
| a rise of 1 in 375 for | 5½ miles, |

which brings us to the summit at

Billinge; then,

| | |
|------------------------------|---------------|
| a fall of 1 in 380 for | 4½ miles, |
| a fall of 1 in 880 for | 2 miles, |
| a fall of 1 in 300 for | 3 miles, |
| a level of | 2½ miles, |
| a fall of 1 in 470 for | 2½ miles, and |
| a level of | ½ mile. |

The whole distance from the junction with the Manchester and Bolton line to Liverpool is thirty-one miles and a half.

By beginning from the foot of the above list and substituting the word *rise* for *fall* and *vice versa*, the lengths and levels from Liverpool eastward will be seen.

Except in approaching Liverpool, where there is a curve of a mile and a half radius, and at the eastern termination, the curves are so slight that the line may be considered straight.

As respects inclination, to obtain which some deep cuttings and high embankments are made, the line is also unexceptionable, as we should have thought the above figures sufficient to prove without the arguments that may be drawn from Messrs Vignoles and Locke's reports, addressed to and as we are informed published by the Directors of the Liverpool and Manchester Railway Company. That those gentlemen think very favorably of the line generally is evident from what they say of the three miles that have the greatest inclination of 1 in 300.

Mr Locke states that one assistant engine on the Sutton incline on the Liverpool and Manchester line, which is a mile and a half long and rises 1 in 90, enables 168 tons which he takes as the full load of *one* locomotive engine on an inclination of 1 in 1300, nearly a level, to be carried from Manchester to Liverpool. Now if *two* locomotive engines of equal power do actually thus take a train of 168 tons up an inclination of 1 in 90, what will *one* of the same engines moved to the North line take? Why, 173 tons on the steepest part of it in either direction! In both cases the speed on the rises will be somewhat reduced, but the reduction will be the same in each, and on the North line the extra power expended and the time lost by diminished speed in the ascents may be regained in descending. Thus, suppose the speed to be sixteen miles an hour on the level and to be reduced to ten on the rise, it may be increased to twenty or twenty-two on the declining lengths; or if the recovery of speed is not important, the engine in descending may work with one cylinder, which Mr Vignoles describes to be often done on the Liverpool and Manchester Railway, "when the other is casually out of order." Let it be observed, however, that all this reasoning is *not* applicable to the engine being *fully* loaded and working to

its full power *on a level*, which we apprehend seldom if ever takes place, perhaps never with passenger trains on the Liverpool and Manchester line. That engines often "do work with one cylinder on their easy gradients," and that they are not generally worked to their full power is indeed stated by Mr Vignoles; and we may here remark that on the *steepest* ascent of the North line the *two* cylinders at work will take nearly a half more load than *one* cylinder on the "easy gradient" of the Liverpool and Manchester Railway.

It may appear strange to you, as it certainly has done to us, that the idea of an *assistant engine* should have been thought of for the North line; it seems only to prove how much an *assistant argument* is required in this case, and we think we may, without prejudice to you, safely avoid all observations relative to the Wapping Tunnel or the inclines on the Liverpool and Manchester Railway, which now for the first time we have heard described as favorable features of that great work, a work we have never yet been provoked to an argument in disparagement of.

Comparing the North line with others, we would first refer to perhaps the best as respects inclinations for which an act has been obtained, viz. the London and Birmingham Railway. Notwithstanding the violent opposition to this project, no one ever attacked it on that head; yet on referring to the deposited plan of the line, we find *thirty* miles or more in lengths of *six* or *seven* miles each which incline 1 in 330, while the North line has only *three* miles in one direction and *two* in the other that rise so much, and even in these lengths the difference is only between 330 and 300, or about two-thirds of a pound per ton. On the Grand Junction line between Liverpool and Birmingham, which neither the Chairman of the Liverpool and Manchester Company who is, we believe, Deputy Chairman of the Grand Junction, nor the Deputy Chairman of the Liverpool and Manchester who is Chairman of the Grand Junction Company, can desire to represent as a bad line, there are, according to the *amended* plan, *seven* miles in one length inclining 1 in 210, yet we have not heard of assistant engines for it. If the North line is defective because it requires such aid for its proper working, how is the Grand Junction to get on? The rises on

the latter must require assistant engines, for which from their great length they are not well adapted, so that it will neither do well with or without them, and must in that case be a very inferior line indeed to the Liverpool and Manchester. Nevertheless, although the Grand Junction will take on the seven miles referred to only two-thirds of what the North line can on its greatest inclination, the proprietors of that concern need not alarm themselves on this account, and much less the friends of the North line ; but we feel as if too much has been said on this subject, and will only add that favorable as the inclinations on the North line are for the thorough trade, they are still more so for the conveyance of coal to the market at either end.

As respects the time for completion and the estimate, our opinion on the former point is that it may be done in about *four* years. Taking again Messrs Vignoles and Locke as a basis, they state a thousand yards a day as the maximum to be placed at *one* end of *one* embankment, and thence deduce seven years. On this we have respectable authority for saying that half as much more is doing at this time on a railway in the North ; but even taking the maximum assigned, if *one* embankment is to delay the completion, why not make up the middle from back cutting of which there may be many faces, and run the surplus excavation into spoil, thus saving the longest and most expensive waggoning, and much time ? The difference of expense would be very trifling.

Mr Meredith estimated the line at the inclinations he had drawn under £550,000, including purchases and other expenses, and the estimate appeared to have been made with great care ; some of his prices were high, but the tunnel low. By the alterations now proposed in the line the great length of tunnel is avoided, and with it a heavy and uncertain expense ; but as we have already stated the quantity of cutting will be much and necessarily increased to accomplish this and obtain the comparatively level line proposed, and this will cause an addition to the expense.

Messrs Vignoles and Locke both make the amount on their assumptions upwards of £1,200,000. Some of the causes of the amount being so great are easily explained. Mr Vignoles says that for "soils

in the vicinity of coal measures" the slopes cannot be less than two horizontal to one vertical. Is sand-stone intended to be included as one of the *soils*? It is common over coal, and is a prevailing measure in Billinge Hill. So also of strata containing shale with thin beds of stone interposed; surely this would not be cut at two to one. The cuttings for fourteen miles of the Leeds and Selby Railway are chiefly in coal measures, and where they are so they do not amount to half the slope Mr Vignoles has assigned as his general rule. As an illustration of the effect of the slopes on the estimates we may instance the heaviest cutting, that of Billinge Hill, in which, after making an allowance for the cutting and filling of coal measures as compared with clay, the slopes would make a reduction of about £150,000 even if the stone were of no value; but if blocks and materials for the bridges be obtained from this cutting, then not only the estimate of the excavation but that of the masonry also will be reduced. A few such items would bring the opposition estimates so near that of Mr Meredith that they would become a proof of its accuracy rather than a contrast to it; and the difference is to be ascribed in a great degree to the fact of Messrs Vignoles and Locke's calculations having been formed from an inspection of the deposited plan only, without knowledge of the strata or even a survey of the ground.

From a calculation founded chiefly on the report of borings now nearly completed, we beg to state our opinion that the cuttings will but little if at all exceed one half of the quantity stated by Messrs Vignoles and Locke, and that the cost of the line will be £585,000, *exclusive of the purchase of land* (of which from four to five hundred acres will be required), and of contingent expenses.

In the reports the Liverpool and Manchester Line is made a standard of comparison for estimate. We are not told what it cost, but we suppose the capital of that Company is generally known, and the inference wished to be drawn is, if with less cutting such a capital was required, how much greater must yours be! Let it be remembered, however, that warehouses, engines and carriages are included in the capital of that Company, and if you should ever require as much to be so laid out as they have, so much the better,

because your trade would then be as great as theirs. But suppose these deducted, and £700,000 or £800,000 to remain for the formation of the railway, does it follow that a similar line could not be done for less now? Mr. Stephenson has often explained the principal causes of the heavy expense, which arose chiefly near the end of the work from peculiar circumstances, and cannot be made the basis for the necessary cost of another line.

In addition to the general advantages of the proposed railway for trade, its eastern termination has been selected as favorable for extension further eastward towards Oldham and Rochdale, and into Yorkshire. The great coal-field, twenty miles long, which the line will cross near the summit, will alone be the source of great trade, and profitable also, as appears from the experience of the Stockton and Darlington Railway Company, nine-tenths of whose revenue is from coal, and the £100 shares are at £250 (with a capital of upwards of £300,000); and also of the Stanhope and Tyne Railway lately opened almost entirely for coal with as great a capital and every appearance of success, and of the various coal-roads now making on a still larger scale.

We are, Gentlemen,

Your most obedient Servants,

JAS. WALKER.

ALFRED BURGESS.

*Great George Street, Westminster,
24th February, 1835.*



